

REMARKS

Claims 1-19 are pending in the application. Claims 1-19 are rejected. The Examiner's rejections are addressed below in substantially the same order as in the office action.

Comments Regarding the Amendments

Claim 14 has been amended to delete the term "vigorous" in response to the Examiner's §112 rejection.

Claim Rejections – 35 USC §112

Claim 14 stands as rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is the position of the Examiner that "Vigorous" renders the claim indefinite because it is subjective language.

Claim 14 has been amended to delete the term "vigorous." Claim 14 is believed to be allowable under §112.

Claim Rejections - 35 USC § 102

Claims 1-4 stand as rejected under 35 U.S.C. 102(b) as being anticipated by Shiraiwa et al. ('921). It is the Examiner's position that Shiraiwa, et al., teaches non-ionic water dispersible blocked polyisocyanate compounds and a method for their production comprising the reaction product of A) polyisocyanate, B) thermally de-blockable isocyanate blocking agents, and C) non-ionic alkoxylated diol corresponding to applicants' claims. The Examiner further states that in particular, the patentees explain that A) is a mixture of hexamethylene diisocyanate (HDI) based isocyanurate and the reaction product of trimethylol propane and toluene diisocyanate, and B) consists of methyl ethyl ketoxime, chemically synonymous with butanone oxime.

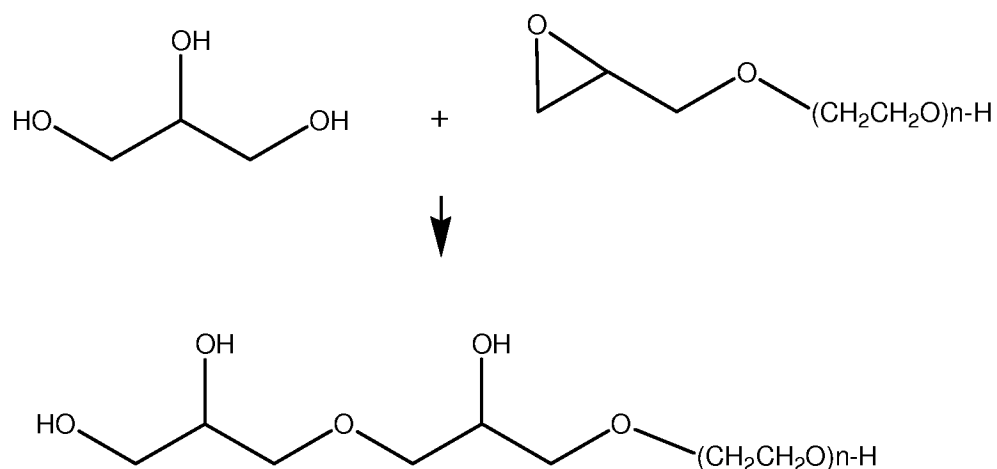
The Examiner also states that regarding the specific polymer backbone structure of compound (iii) limitation of formulate (III) in claims 1 and 3, patentees explain that the hydrophilic compound is the reaction product of polyalkylene glycol glycidyl ether and multifunctional active hydrogen compounds such as glycerol, and/or trimethylol propane, which would result in compounds containing pendant (II) and (III).

The Applicants respectfully traverse the Examiner's rejections for the following reasons. **First, the non-ionic blocked polyisocyanate of the present application are not disclosed by '921, because the organic compound represented by general formula (I) of '921 are different from the compounds (iii) of claim 1.** This is clearly shown once the formulae are compared with inclusion of the limitations defined for: A, B, Z, R^1 , R^2 , R^3 , a, k, m, and n.

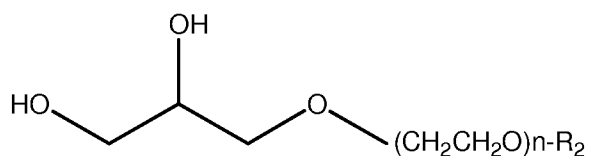
For example, this is illustrated with corresponding compounds of formula (I). Where the limitations $m=1$, $a=0$, $k=1$, $R^1 = C_2$ or C_3 alkylene are used, in formula (I) of '921 this means a number from 0 to 5 for the ethylene oxide propylene oxides moieties, while in formula (I) of the present application $n+m$ is a number from 20 to 80. There is a substantial difference between a compound having from 0 to 5 of these moieties as compared to one having from 20 to 80.

The examiner states that in '921 reference, the hydrophilic compound may be "the reaction product of polyalkylene glycol glycidyl ether and multifunctional compounds such as glycerol, and/or trimethylol propane" and this "would result in compounds containing pendant (II) and (III) respectively. This is not correct, at least not fully correct.

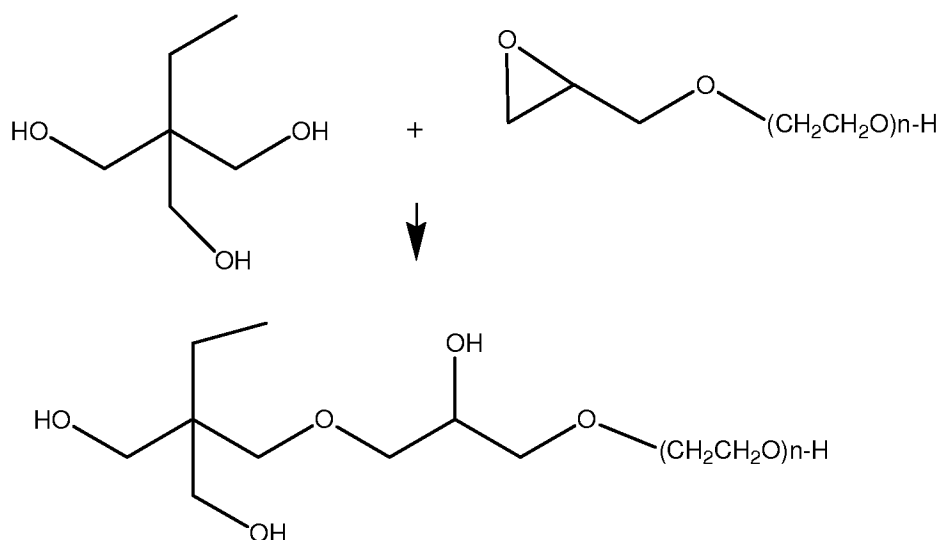
When a polyalkylene glycol glycidyl ether is reacted with glycerol it does result in compounds containing pendant (II), but these compounds do not satisfy the general formula (I) of the present application wherein R_1 is (II). This is illustrated for polyethylene glycol glycidyl ether:



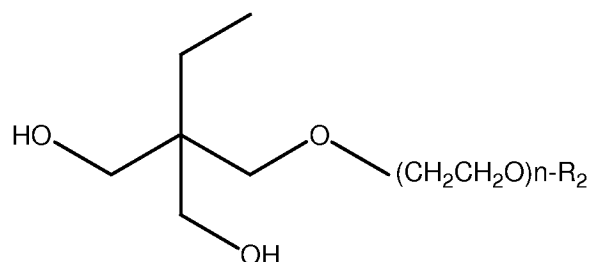
In contrast, the compounds of general formula (I) wherein $R_1=(\text{II})$ and $m=0$ of the present application are instead:



When polyalkylene glycol glycidyl ether is reacted with trimethylol propane it does result in compounds containing pendant (III), but the compounds do not satisfy the general formula (I) of the present application wherein R_1 is (III). This is illustrated below for polyethylene glycol glycidyl ether:



The compounds of general formula (I) wherein $R_1=(III)$ and $m=0$ are:



Compound (iii) of the present application does not possess the additional secondary hydroxyl groups deriving from the epoxy group of the glycidyl ether.

Yet another reason that the present invention is not anticipated by the '921 reference is that '921 does not teach aqueous dispersions of blocked polyisocyanate compounds as is required in, for example, Claim 1. In '921, the hydrophilic groups are in fact said to improve low-temperature flexibility and adhesion of polyurethane coatings films, but nothing is said about the possibility of dispersing in water the polyisocyanate compounds.

Claim Rejections - 35 USC § 103

Claims 1-8 and 11- 13 stand as rejected under 35 U.S.C. 103(a) as being unpatentable over Jonderko et al (200210061999) in view of Shiraiwa et al ('921). It is the Examiner's position that Jonderko et al teach coatings based on non-ionic water dispersible blocked polyisocyanate compounds and a method for their production comprising the reaction product of A) polyisocyanate, B) thermally de-blockable isocyanate blocking agents, and C) non-ionic hydrophilic alkoxyated diol. The Examiner states that in particular, patentees explain that A) is a mixture of hexamethylene diisocyanate (HDI) based isocyanurate and the reaction product of trimethylol propane and toluene diisocyanate, and B) consists of dimethyl pyrazole, and methyl ethyl ketoxime, which is chemically synonymous with butanone oxime.

The Examiner further notes that in particular, patentees explain that that polyisocyanate is reacted with the hydrophilic diol at 60°C in an amount that results in an urethane compound having a free NCO content between 7 and 8%, followed by the reaction with B) in the presence of methyl ethyl ketone solvent; and that the blocking agent B) is present relative to the free NCO groups in a slight stoichiometric excess, which is taken to satisfy claims 6 and 13. The Examiner notes that Jonderko et al., fails to teach hydrophilic diols that correspond to the compounds listed in claims 1, 3, 6 and 7.

The Examiner continues that Shiraiwa et al also teaches hydrophilic blocked polyisocyanates that are the reaction product of A) polyisocyanate, B) thermally de-blockable isocyanate blocking agents, and C) non-ionic hydrophilic alkoxyated diol, wherein A) consist of hexamethylene diisocyanate (HDI) based isocyanurate and the reaction product of trimethylol propane and toluene diisocyanate, and B) consists of methyl ethyl ketoxime. The Examiner states that patentees go on to disclose that the preferred C) compounds consist of groups that are the reaction products of polyalkylene glycol glycidyl ethers and trimethylol propane and/or glycerol, which satisfy the compounds of claims 1,3, and 6; and that patentees explain that the resulting coatings based on the hydrophilic

blocked polyisocyanates exhibit improved low-temperature flexibility and adhesion thereby increasing the types of substrates to which the coating can be applied.

The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to include the hydrophilic polyether diols of Shiraiwa et al in Jonderko et al based on the motivation that both are drawn to analogous applications, and the diols of Shiraiwa et al increase the performance and versatility of the resulting coating composition; and that, furthermore, both Shiraiwa et al and Jonderko et al teach that the preferred ratio of NCO to diol is at least 1:1, based on this stoichiometry, and the structural formula of the non-ionic alkoxyated diol, the claimed ethoxy group content of claim 1:1 would be satisfied. The Examiner finishes his analysis for these claims by stating that it is important to note that although Jonderko et al., discloses the use of ionic-based water dispersants, these compounds are optional and as a result, it would have been obvious to omit said ionic groups based on the motivation that it has been held the omission of an element with consequent loss of function is obvious.

Claims 9-10 and 14-19 stand as rejected under 35 U.S.C. 103(a) as being unpatentable over Jonderko et al (2002/0061999) in view of Shiraiwa et al ('921) and in further view of Reiff et al.,('737). The Examiner repeats the assertion that Jonderko et al in view of Shiraiwa et al render obvious a non-ionic blocked polyisocyanate composition that is the reaction product of A) polyisocyanate, B)thermally de-blockable isocyanate blocking agents, and C) non-ionic hydrophilic alkoxyated diol in the presence of solvent. The Examiner notes that both Jonderko et al and Shiraiwa et al are silent in specifying the amount of solvent, applications that correspond to claims 15-17, or a content of TDI isomers corresponding to claims 18 and 19.

The Examiner follows with a statement that Reiff et al teach water-dispersible blocked polyisocyanates comprising the reaction product of polyisocyanates and non-ionic hydrophilic surfactants consisting of polyethylene oxide, which is then blocked with butanone oxime, and that these compounds are useful in coatings. The Examiner notes

that specifically, Reiff et al., discloses polyisocyanates based on the reaction product of TDI and trimethylol propane, wherein the TDI consists of 2,4 and 2,6 isomers present in a ratio of 80:20 by weight and therefore it would have been obvious to utilize the TDI isomer mixture disclosed by Reiff et al in the composition of Jonderko et al based on the motivation that Reiff et al teach them to be useful in applications analogous to Jonderko et al, and it is prima facie obvious to add a known ingredient for its known function.

Further, the Examiner states that Reiff et al teaches that the blocking agent is present relative to free NCO groups in a ratio ranging from 1 : 1 to 1.1 : 1, and the blocking reaction takes place in methyl ethyl ketone solvent in an amount corresponding to applicants' claimed range; and based on this disclosure, it would have been obvious to arrive at applicants' claimed solvent content of claim 9 based on the motivation that it is the preferred amount when blocking polyisocyanates, such as TDI, with butanone oxime blocking agents. The Examiner continues with the statement that patentees explain that the water-dispersible blocked polyisocyanates preferably have a solids content between 25 and 50-wt%, the hydrophilic polyisocyanates are useful in oil and/or water repellent textile coatings, and these coatings may further comprise perfluorinated polymeric compounds present in amounts relative to the blocked polyisocyanate by a 1:1 to 1: 12, which satisfies claim 15. The Examiner also states that the blocked polyisocyanates may also be combined at a concentration of 0.5-5-wt% with an impregnating liquor, which is applied to textiles, taken to satisfy claims 16 and 17.

The Examiner then concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the blocked polyisocyanates of Jonderko et al in oil and water repellant textile coatings based on the motivation that Jonderko et al and Reiff et al have analogous compositions and in obviousness rejections based on close similarity in chemical structure, the necessary motivation to make a claimed compound, and thus prima facie face of obviousness, rises from the expectation that compounds similar in structure will have similar properties; and that it would have been obvious to arrive at the solids content disclosed in Reiff et al based on the motivation that it is the preferred range for

applications in oil and water repellent textile coatings; in order to successfully employ the water dispersible blocked polyisocyanates in such applications, one would be motivated to use the solids content disclosed by Reiff et al.

The Applicants respectfully traverse the Examiner's §103 rejections for the following reasons. **It would have not been obvious to one of ordinary skill in the art to modify and include the hydrophilic polyether of Shiraiwa et al ('921) in Jonderko (2002/0061999) because they are not drawn to analogous applications:** although both deal with coatings, Jonderko is specifically directed to curing components in baking enamels, where low-temperature adhesion and flexibility are obviously not essential, while Shiraiwa is concerned with non-aqueous coating protective compositions. The present application teaches how to improve the dispersion stability of blocked polyurethane dispersions, by means of the specific diols of formula (I). As for the preferred ratio of NCO to diol, Shiraiwa, in col. 3 lines 19-25 of '921 says that the ratio of NCO to terminal hydroxyl groups in the organic compounds is at least 1:1. When the organic compound is a diol (and this may not be the case) the minimum molar ratio of NCO to diol is therefore 2:1. Jonderko, in par [0039], says that it is advantageous to employ a maximum ratio of NCO reactive group (hydroxyl group) to NCO of 1.

The Applicants respectfully disagree with the Examiner's opinion that the stoichiometry of Shiraiwa and Jonderko teaches to choose said percentages: the ethoxy groups content in the final blocked polyisocyanate does not only depend on the ratio of NCO to NCO reactive groups, but also on the content of ethoxy groups in the polyether polyol used, which in both cases is variable.

Another reason that the claims of the present application are not obvious over the Examiner's cited references is that **Reiff's blocked polyisocyanates contain ionic groups, while the blocked polyisocyanates of the present invention are fully non-ionic and nonetheless water dispersible.** In par [002] it is explained that providing non-ionic blocked water-dispersible polyisocyanate was an objective of the present invention.

In the examples it is further illustrated that non-ionic blocked water-dispersible polyisocyanate providing stable aqueous dispersions are obtained only if the specific non-ionic alkoxyated diol having general formula (I) are used as the hydrophilic component. The blocked polyisocyanates of Jonderko, when non-ionic and made from monofunctional polyethylene glycol monoalkyl ethers (see par [0024] of Jonderko and comparative Examples 4 and 6 of the present application), would result in unstable aqueous dispersions.

Yet another reason that the claims of the present invention are not obvious over the prior art is that **none of the prior art teaches how to modify the blocked isocyanates of Reiff to render them simultaneously non-ionic and still capable of providing stable aqueous dispersions useful in textile printing pastes and in oil and/or water repellent finishing of textiles.**

Finally, as already fully treated in the response to the §102 rejection, the compounds taught in '921 are substantially and materially different in regard to ethylene oxide and propylene oxide moieties. This alone imparts properties so different that the '921 reference could not be used with confidence regarding reconstructing the invention of the present application.

CONCLUSION

For all the foregoing reasons, Applicant submits that the application is in a condition for allowance.

It is believed that no fee is due for this paper. The Commissioner is hereby authorized to charge any additional fees or credit any overpayment to Deposit Account No. **13-0010 (LSP-1011US)**.

Respectfully submitted,

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